REMARKS

Claims 13, 14 and 16-24 are pending in the application. Claims 13-15 and 18-20 were rejected under 35 U.S.C. §102(b), as described on page 2 of the Office Action. Claims 16-17 and 21-24 were rejected under 35 U.S.C. §103(a), as described on pages 2-3 of the Office Action. Claims 13, 14, 16, 18, 21 and 24 are the only independent claims.

In order to judge whether a certain crystal is a nonlinear optical crystal, first powdered fine crystals are reproduced, and then the powdered fine crystals are irradiated with high intensity laser light. Observing a nonlinear signal from the crystals can then directly be considered.

It is possible to theoretically predict whether a certain crystal is a nonlinear optical crystal. The method includes growing a single crystal, then producing spherical elements with a diameter of 1 mm or less from the single crystal growth, and finally determining a detailed structure of the crystal via a 4 axis X-ray crystal structure analysis. From a point group obtained in this method, it can be predicted whether the crystal has a structure having optical nonlinearity.

The present invention was discovered based on the result of the above-mentioned direct observation and structural analysis.

Moreover, in order to judge whether a certain crystal can be used for wavelength conversion for generating ultraviolet light, the crystal needs further measuring in the transparency region and of dispersion of its refractive indices. Then it is possible to conclude whether the nonlinear optical crystal is capable of generating ultraviolet light.

Independent claim 13 is drawn to **a nonlinear optical crystal for generating ultraviolet light**. The **nonlinear optical crystal** of claim 13 is required to comprise a compound represented by the formula $K_2Al_2B_2O_7$.

Independent claim 14 is drawn to a method a making a nonlinear optical crystal for **generating ultraviolet light**, wherein the nonlinear optical crystal comprises a compound represented by the formula $K_2Al_2B_2O_7$. The method of claim 14 comprises growing a **nonlinear optical crystal** comprising a compound represented by the formula $K_2Al_2B_2O_7$ via solution **growth with a flux** that is at least one material selected from the group consisting of lead oxide, sodium fluoride, cesium fluoride, lead fluoride or potassium chloride.

Independent claim 16 is drawn to a method of converting a wavelength for **generating ultraviolet light**. The method of claim 16 comprises, *inter alia*, growing a **nonlinear optical crystal** comprising a compound represented by the formula $K_2Al_2B_2O_7$ via solution **growth with a flux**.

Independent claim 18 is drawn to a wavelength conversion element for **generating ultraviolet light**. The wavelength conversion element of claim 18 comprises, *inter alia*, a **nonlinear optical crystal** comprising a compound represented by the formula $K_2Al_2B_2O_7$.

Independent claim 21 is drawn to a wavelength conversion apparatus for **generating ultraviolet light**. The wavelength conversion apparatus of claim 21 comprises, *inter alia*, a wavelength conversion element comprising a **nonlinear optical crystal** comprising a compound represented by the formula $K_2Al_2B_2O_7$.

Independent claim 24 is drawn to a wavelength conversion method for **generating ultraviolet light**. The method of claim 24 comprises illuminating, with laser light, a **nonlinear optical crystal** comprising a compound represented by the formula $K_2Al_2B_2O_7$.

It is respectfully submitted that the cited Russian Article fails to teach or suggest the above-identified limitations.

The cited Russian Article discloses a $K_2Al_2B_2O_7$ crystal itself and its planar spacing calculated from the result of X ray diffraction. However, the reference fails to teach that the disclosed $K_2Al_2B_2O_7$ crystal is a nonlinear optical crystal.

Therefore, the Russian Article fails to teach or suggest a nonlinear optical crystal, let alone a nonlinear optical crystal for generating ultraviolet light.

Furthermore, with respect to claim 14, although whether flux is used for crystal growth depends on a particular crystal, generally a flux method is used. However, it cannot be judge whether a certain flux is applicable to growth of a certain crystal. That is, feasability of flux growth and the kinds of flux are the objects of research.

It is respectfully submitted that the Russian Article fails to teach growth of $K_2Al_2B_2O_7$ via solution growth with a flux. Therefore, for this additional reason, the Russian Article fails to anticipate claim 14.

As anticipation under 35 U.S.C. § 102 requires that each and every element of the claim be disclosed in a prior art reference, *Akzo N.V. v. U.S. Int'l Trade Commission*, 808 F.2d 1471 (Fed. Cir. 1986), based on the foregoing, it is clear that the Russian Article does not anticipate claims 13, 14, 16, 18, 21 and 24.

Further, as claims 17, 19, 20, 22 and 23 are dependent upon claims 16, 18 and 21, respectively, and therefore include all of the limitations thereof, it is additionally respectfully submitted that claims 17, 19, 20, 22 and 23 are additionally novel over the Russian Article within the meaning of 35 U.S.C. § 102.

It is respectfully submitted that Chai et al. (Chai) fails to teach the shortcomings of the Russian Article such that a combination of the teachings of the Russian Article and Chai would teach that which is required in independent claims 13, 14, 16, 18, 21 and 24.

As discussed on page 3 of the Office Action, Chai is relied upon for teaching a laser light 201 (laser source) in Fig. 6. Nevertheless, Chai fails to teach or suggest a nonlinear optical crystal, solution growth with a flux, or generating ultraviolet light. Accordingly, it is respectfully submitted that a combination of the Russian Article and Chai additionally fails to teach that which is required in claims 13, 14, 16, 18, 21 and 24.

In view of the above remarks, Applicant respectfully submits that claims 13, 14 and 16-24 would not have been obvious over the combination of the Russian Article in view of Chai, under 35 U.S.C. § 103(a).

With respect to SPIE WEB, the reference is a manuscript that is exhibited on September 16, 1998 during an international conference on Photonics held in China. The present inventors' paper was listed in the reference, (please note the attached published abstract). Although the reference indicates that it was published "in August" in SPIE, the book was not exhibited or published in August. It is respectfully submitted that the incorrect publication date is a mistake of SPIE. The present application has a claim of priority of August 4, 1998, which is prior to the Exhibition date of September 16, 1998.

Having fully and completely responded to the Office Action, Applicants submit that all of the claims are now in condition for allowance, an indication of which is respectfully solicited.

If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

Respectfully submitted,

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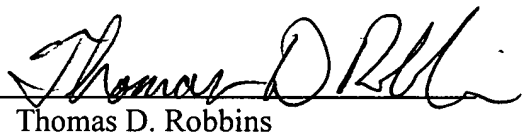
By: 

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